

UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

*In re* Flint Water Cases

Judith E. Levy  
United States District Judge

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This Order Relates To:

*Bellwether I Cases*  
Case No. 17-10164

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**OPINION AND ORDER GRANTING IN PART AND DENYING IN  
PART DEFENDANTS VEOLIA NORTH AMERICA, LLC, VEOLIA  
NORTH AMERICA, INC., AND VEOLIA WATER NORTH  
AMERICA OPERATING SERVICES, LLC'S MOTION TO  
EXCLUDE THE TESTIMONY AND REPORT OF DR. JOSEPH  
GRAZIANO [338]**

This opinion is one in a series addressing the admissibility of the testimony and reports of eight experts retained by Plaintiffs in anticipation of the first bellwether trial, currently set to begin on February 15, 2022. Defendants argue that none of these experts can meet the standards set by Federal Rule of Evidence 702 and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

Currently before the Court is the motion by Veolia North America, LLC, Veolia North America, Inc., and Veolia Water North America Operating Services, LLC (collectively “VNA”) to exclude the testimony and report of Dr. Joseph Graziano (ECF No. 338.) The LAN and LAD Defendants join VNA’s motion. (ECF No. 344.) For the reasons set forth below, VNA’s motion to exclude is GRANTED IN PART and DENIED IN PART.

## **I. Background**

Dr. Joseph Graziano is a Professor of Environmental Health Sciences and Pharmacology at Columbia University. (ECF No. 369-3, PageID.23631.) Dr. Graziano holds a Ph.D. in physiology and is a leading expert on the effects of metal-poisoning. (ECF No. 369-3, PageID.23630.) He has worked for decades on developing medication to treat lead poisoning and is the inventor of what is now the standard treatment for lead poisoning. (*See* ECF No. 433, PageID.33278-33280; PageID.33287-33292.) Dr. Graziano’s qualifications as an expert are not disputed.

Plaintiffs seek to offer Dr. Graziano as one of their causation experts. They retained Dr. Graziano to determine whether lead-poisoning can cause the adverse health effects they have experienced,

and to write a general report about the medical consequences of exposure to lead. In preparation for his report, Dr. Graziano conducted a comprehensive literature review. That review covered many studies, but one source in particular is of recurring importance. The Agency for Toxic Substances and Disease Registry (“ATSDR”)<sup>1</sup> has published a *Toxicological Profile of Lead* which contains an exhaustive review of decades of academic work on the harmful effects of lead. Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Lead* (Aug. 2020) (<https://www.atsdr.cdc.gov/ToxProfiles/tp13.pdf>) (“Toxicological Profile”). The *Toxicological Profile* is one of the most thorough and authoritative sources available on the topic of lead-poisoning.

Dr. Graziano’s primary conclusion is that “overwhelming” scientific evidence proves that lead poisoning harms the intellectual and neurobehavioral functioning of children. (ECF No. 330-32, PageID.15424.) That conclusion is supported by the *Toxicological Profile*, which itself reviews 40 longitudinal studies on lead’s neurocognitive

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<sup>1</sup> The ATSDR is the federal agency directed to implement certain provisions of the Comprehensive Environmental Response, Compensation and Liability Act. *See* 42 U.S.C. §9604(i) (setting forth responsibilities of the ATSDR). The preparing of toxicological profiles is one of those responsibilities. *See id.* at §9604(i)(3).

effects in children. *See Toxicological Profile*, at 140-176.<sup>2</sup> But Dr. Graziano also finds support for his conclusion elsewhere. For instance, a 2005 study found by a 95% confidence level that every 1 µg/dl increase in blood lead corresponded to a -2.9 change in full-scale IQ. Bruce P. Lanphear et al., *Low-level environmental lead exposure and children's intellectual function: an international pooled analysis*, 113 *Environ Health Perspect.* 894-899 (2005) (“Lanphear (2005)”). Dr. Graziano concludes that any “undue exposure” to lead “is harmful to a child’s intellectual development.” (ECF No. 330-32, PageID.15430.)

Dr. Graziano next emphasizes that the neurological effects of lead-poisoning affect “dimensions of function that go well beyond just intelligence and IQ scores.” (ECF No. 330-32, PageID.15424.) As set forth in the *Toxicological Profile*, lead-poisoning is additionally associated with “altered behavior and mood (e.g., attention, hyperactivity, impulsivity, irritability, delinquency) and altered neuromotor and neurosensory function.” *Id.* Behavioral effects can include aggression and antisocial behaviors. (*Id.* at PageID.15427.) Indeed, some studies have found a

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<sup>2</sup> The *Toxicological Profile*’s analysis is not limited to blood lead levels. It also reviews studies associating bone lead levels and neurological harms. *See Toxicological Profile*, at 174-176.

direct link between high bone lead content and social, attention, and aggression problems. Herbert L. Needleman et al., *Bone lead levels and delinquent behavior*, 275 *Jama* 363-369 (1996).

According to Dr. Graziano, lead-poisoning can also contribute to other neurological complications, such as schizophrenia and Parkinson's disease. (ECF No. 330-32, PageID.15425-15426) (citing Ezra B. Susser et al., *Prenatal factors and adult mental and physical health*, 44 *Can. J. Psychiatry* 326-334 (1999); Ezra S. Susser et al., *The design of the prenatal determinants of schizophrenia study*, 26 *Schizophrenia Bull.* 257-273 (2000)). Finally, Dr. Graziano notes that exposure to lead can increase the risk for renal disease and hypertension. (ECF No. 330-32, PageID.15429-15430.)

On May 11, 2021, VNA filed a motion seeking to exclude Dr. Graziano's opinions. (ECF No. 338.) The Court heard oral argument on the motion on November 2, 2021. (ECF No. 410.)

## **II. Legal Standard**

The admissibility of expert testimony is governed by Federal Rule of Evidence 702, which sets forth three requirements: (1) the witness must be qualified, (2) the testimony must be relevant, and (3) the

testimony must be reliable. Fed. R. Evid. 702; *In re Scrap Metal Antitrust Litig.*, 527 F.3d 517, 528–29 (6th Cir. 2008). As the Supreme Court explained in *Daubert*, Rule 702 imposes a “gatekeeping” obligation on the courts to ensure that scientific testimony “is not only relevant, but reliable.” *Daubert*, 509 U.S. at 589; *See also Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 147 (1999).

*Daubert* provides a non-exclusive list of factors courts may consider when evaluating reliability: (1) whether the theory or technique at the basis of the opinion is testable or has been tested, (2) whether it has been published and subjected to peer review, (3) what the known error rates are, and (4) whether the theory or technique is generally accepted. *Daubert*, 509 U.S. at 593; *see also In re Scrap Metal*, 527 F.3d at 529 (listing same factors). Not every factor needs to be present in every instance, and courts may adapt them as appropriate for the facts of an individual case. *Kumho* 526 U.S. at 150.

“Rejection of expert testimony is the exception, rather than the rule.” *United States v. LaVictor*, 848 F.3d 428, 442 (6th Cir. 2017) (quoting *In re Scrap Metal*, 527 F.3d at 529–30)). Nevertheless, the burden is on Plaintiffs to show by a “preponderance of proof” that the

proffered expert meets the standards of Rule 702 as interpreted by *Daubert*. *Pride v. BIC Corp.*, 218 F.3d 566, 578 (6th Cir. 2000) (quoting *Daubert*, 509 U.S. at 592).

### III. Analysis

Dr. Graziano is one of Plaintiffs' general causation experts. Michigan law requires toxic tort plaintiffs to show general causation, which "pertains to whether a toxin is capable of causing the harm alleged." *Powell-Murphy v. Revitalizing Auto Comm's Environ. Response Trust*, 333 Mich. App. 234, 250 (2020) (quoting *Lowery v. Enbridge Limited P'ship.*, 500 Mich. 1034, 1043 (2017) (Markman, C.J., concurring)). Toxic tort plaintiffs must also show "specific causation," that is, they must also have "proof that exposure to the toxin more likely than not caused *the plaintiff's* injury." *Id.* (quoting *Lowery*, 500 Mich. at 1044)). But that is the job of other experts: Dr. Graziano speaks only to general causation.

The parties' briefs debate at length whether Dr. Graziano's testimony could suffice to prove general causation under Michigan law. It must be clarified at the outset that this is not at issue in this motion. *Daubert* does not require that an expert singlehandedly deliver plaintiffs

a win on any particular legal issue, and Dr. Graziano is not the only witness who Plaintiffs have offered on this topic. At summary judgment, the Court will consider whether Plaintiffs have raised a material question of fact as to the element of general causation. At this stage the question is only whether Dr. Graziano's opinions are sufficiently relevant and reliable to be admissible under Federal Rule of Evidence 702 and *Daubert*.

VNA argues that they are not, for four reasons. First, while they concede that lead exposure can cause intelligence decrements, VNA challenges Dr. Graziano's opinion that *any* exposure to lead could cause such harm. (ECF No. 330-4, PageID.14301-14310.) Next, VNA objects to Dr. Graziano's opinions about every other alleged health effect of lead exposure because, it argues, (1) Dr. Graziano does not reliably identify causal links, and (2) testimony regarding health conditions not suffered by any Plaintiff is irrelevant. (*Id.* at PageID.14314-19.) Finally, VNA asks the Court to bar Dr. Graziano from testifying generally about the background of the Flint water crisis. (ECF No. 338, PageID.20239.)

For the reasons set forth below, the Court finds that Dr. Graziano's methods and conclusions are scientifically reliable and are admissible

under *Daubert* and Rule 702. However, the Court agrees with VNA that Dr. Graziano's testimony regarding health conditions from which no Plaintiff suffers should be excluded, as should his opinions about the causes of the Flint water crisis. Moreover, Dr. Graziano will be required to clarify his opinion that any exposure to lead causes neurocognitive harm.

#### **A. 'Any Exposure is Harmful' Testimony**

According to VNA, Dr. Graziano's opinion that any exposure to lead can cause cognitive harms is fundamentally inconsistent with the basic principle of toxicology that the dose of exposure to a toxin determines the response. (ECF No. 330-8, PageID.14301.) Moreover, VNA argues, courts routinely disallow testimony to the effect that any dose of a toxin can cause harm. Indeed, VNA claims that a "bedrock principle of Michigan law" prohibits such testimony.<sup>3</sup> (ECF No. 338, PageID.20221.)

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<sup>3</sup> Note that federal procedural law applies to this diversity case. *Legg v. Chopra*, 286 F.3d 286, 289 (6th Cir. 2002) (citing *Erie R.R. Co. v. Tompkins*, 304 U.S. 64 (1938)). Whether a witness' testimony is admissible under Rule 702 and *Daubert* is a procedural issue. *Id.* at 291. Accordingly, it is governed by federal, not Michigan law. Michigan law governs the substantive question whether Plaintiffs can establish the element of causation, but as has already been noted, that question is not at issue here. In any event, neither Michigan nor federal law supports VNA's contentions.

VNA is incorrect. There is no general rule prohibiting an expert from opining that a toxin can cause harms at any level of exposure, so long as that opinion is otherwise reliable. In fact, there is no blanket prohibition on testimony with any particular content, because that would be fundamentally inconsistent with *Daubert*. “Science is not an encyclopedic body of knowledge about the universe. Instead, it represents a *process* for proposing and refining theoretical explanations about the world.” *Daubert*, 509 U.S. at 590 (emphasis in original). The Court’s gatekeeping obligation is limited to determining whether an expert has followed that process in a reliable way. *United States v. Bonds*, 12 F.3d 540, 556 (6th Cir. 1993) (*Daubert* evaluation concerns only the experts “methodology and principles,” not her conclusions). None of VNA’s caselaw shows otherwise.

VNA first cites to cases setting forth the element of specific causation. (*Id.* at PageID.14302 (citing *Lowery v. Enbridge Energy Ltd. P’ship.*, 500 Mich. 1034, 1043 (2017) (Markman, C.J., concurring); *Powell-Murphy*, 333 Mich. App. 234, 249-251 (2020)). These cases explain that a plaintiff can show specific causation only by a showing “of enough exposure to cause the plaintiff’s specific illness.” *Lowery*, 500 Mich. at

1043. After all, “a substance may cause different harmful effects in different doses.” *Id.* at 1044. VNA’s reliance on this law is doubly misplaced. The *Lowery* and *Powell-Murphy* passages on which they rely discuss what must be shown to satisfy the *specific* causation element *at trial*; this motion is about the *admissibility* of *general* causation testimony.<sup>4</sup>

VNA next cites to a set of cases applying *Daubert* to specific causation expert testimony. These cases stand for the general rule that a specific causation expert cannot rely exclusively on the fact that ‘any exposure is harmful’ to infer that the exposure caused the harm *to plaintiff*. For instance, in *Nelson v. Tenn. Gas Pipeline Co.*, an expert who simply assumed that a toxin’s dose was sufficient to harm the plaintiffs could not reliably testify that the toxin was the cause of those plaintiffs’ injuries. 243 F.3d 244, 252-53 (6th Cir. 2001). Similarly, in *Pluck v. BP Oil Pipeline Co.*, an expert impermissibly relied on a ‘no safe exposure’ theory to conclude that the exposure in fact caused the plaintiff’s injury. 640 F.3d 671, 675 (6th Cir. 2011); *See also Adams v. Cooper Indus., Inc.*,

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<sup>4</sup> VNA’s citations to secondary sources about the element of specific causation are not applicable for the same reasons.

No. 03-476-JBC, 2007 WL 2219212 (E.D. Ky. July 30, 2007) (rejecting specific causation testimony because it did not consider dose and exposure data.)

In other words: a specific causation expert may not infer from the fact that a toxin is always harmful that a particular plaintiff was actually injured by exposure to that toxin. Such an inference is improper because it overlooks the possibility that a plaintiff's injuries were caused by something else. *See, e.g., Nelson*, 243 F.3d at 253 (there was "simply no basis for [the expert's] assumption that PCB's, and not one of numerous other factors, was the cause of plaintiffs' reported maladies."); *McClain v. Metabolife*, 401 F.3d 1233, 1243-44 (11th Cir. 2005) (discussing similarly fallacious causation testimony). But Dr. Graziano, a general causation expert, does not make that mistake. His testimony is not that *because* lead is always dangerous, it must have caused *these Plaintiffs' injuries*. Dr. Graziano simply opines that lead is always harmful. Nothing in *Nelson* or *Pluck* forbids such testimony.

VNA cites to some cases involving *Daubert* evaluation of general causation testimony, but none of them stand for the rule VNA advances. In *Wills v. Amerada Hess Corp.* 379 F.3d 32 (2d Cir. 2014), the Second

Circuit rejected an expert who intended to advance the “oncogene theory of causation” at trial. *Wills*, 379 F.3d at 38. According to this theory, some toxins can cause cancer through the interaction of a single molecule of toxin with single human cell. *Id.* The court rejected that opinion because “it had not been tested or subjected to peer review...there was no known potential error rate,” and it was not supported by a single epidemiological study. *Id.* at 39-40. So: the testimony in *Wills* was inadmissible because it did not satisfy any of the ordinary *Daubert* factors—not because of a purported “bedrock principle” that a witness may never testify that any exposure to a toxin is dangerous. Had such a rule existed, the Second Circuit’s analysis of the *Daubert* factors would have been wholly superfluous.

Similarly, in *Henricksen v ConocoPhillips Co.*, a district court rejected the testimony of a general causation expert because the expert’s opinions were completely unsupported by published work and based only on the expert’s “personal beliefs.” 605 F.Supp.2d 1142, 1161 (E.D. Wash 2009). That testimony did not survive *Daubert* scrutiny because the Ninth Circuit “requires general causation opinions to be supported by

reliable epidemiological studies, or, if there are none, a reliable differential diagnosis.” *Id.*<sup>5</sup>

In sum: nothing supports VNA’s claim that a general principle of law forbids Dr. Graziano from testifying to his opinion that any undue exposure to lead can be harmful. The Court therefore applies the ordinary *Daubert* standards to evaluate his testimony.

Dr. Graziano’s testimony is unquestionably based on scientifically reliable research. “Since 1984, more than 40 epidemiological studies have examined the relationship between children’s blood lead concentrations below 10 µg/dl and intellectual deficits.” (ECF No. 330-32, PageID.15.) Several of these studies showed detrimental effects on intelligence with blood lead concentrations as low as 0.9 µg/dl and miniscule dentine lead levels of 1 ppm. *See, e.g.,* Lanphear (2005); Bruce P. Lanphear, *Erratum: Low-level environmental lead exposure and children’s intellectual function: an international pooled analysis*, 127 *Environ. Health Perspect.*

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<sup>5</sup> VNA also cites to cases that disqualify experts for reasons wholly unrelated to their causation opinions, such as *Whiting v. Boston Edison Co.*, where the court disqualified an expert without any relevant expertise. 891 F.Supp.12, 25 (D. Mass 1995).

9 (2019);<sup>6</sup> Joel Schwartz, *Low-Level Lead Exposure and Children's IQ: A Meta-analysis and Search for a Threshold*, 65 *Environmental Research* 42, 53 (1994). The *Toxicological Profile* itself concludes that there is “no evidence for a threshold” for lead toxicity in children. *Toxicological Profile*, at 133.

VNA asserts that Dr. Graziano should not be permitted to rely on the *Toxicological Profile* because it is a regulatory risk assessment and therefore inappropriate for use in evaluating legal causation. (ECF No. 330-4, PageID.14306.) This is plainly untrue: the ATSDR does not set any of the relevant regulatory standards—the CDC does.<sup>7</sup> The *Toxicological Profile* merely provides “public health officials, physicians, toxicologists and other interested individuals and groups with an overall perspective on the toxicology of lead.” *Toxicological Profile*, at 10. In any event, even if the *Toxicological Profile* itself were an impermissible source, that

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<sup>6</sup> VNA claims this study is unreliable, but it must save attacks on the content of peer-reviewed, published scientific work for trial. “Submission to peer-review generally suffices under *Daubert*.” *United States v. Gissantaner*, 990 F.3d 457, 468 (6th Cir. 2021).

<sup>7</sup> See CDC, *Blood Lead Reference Value* (April 21, 2021), <https://www.cdc.gov/nceh/lead/data/blood-lead-reference-value.htm>.

would not undermine any of the studies it cites, which are ultimately the basis for Dr. Graziano's opinions.

What is clear from the scientific evidence reviewed by Dr. Graziano is that (1) lead can cause negative cognitive outcomes at blood lead levels as low as 0.9 µg/dl and dentine lead levels as low as 1 ppm, (2) there is no evidence that a toxicity threshold exists for lead. These statistics, combined with the undisputed fact that the natural environment also contains lead, show Dr. Graziano's opinion that "any undue [i.e., additional, unnatural] exposure...is harmful to a child's intellectual development" to be an eminently reasonable inference from the available scientific data. (ECF No. 330-32, PageID.15430.) Experts may permissibly draw such inferences. *See In re Heparin Prod. Liab. Litig.*, 803 F.Supp.2d 712, 742 (N.D. Oh. 2011) ("to be considered appropriately scientific, the expert need not testify to what is 'known' to a certainty but must only state an inference or assertion derived by the scientific method.") (quoting *Jahn v. Equine Serv., PSC*, 233 F.3d 382, 388 (6th Cir. 2000)).

VNA next argues that Dr. Graziano's opinion is also irrelevant under Rule 702, and more prejudicial than probative under Rule 403.

According to VNA, Dr. Graziano's opinions are irrelevant because they do not help the jury determine whether the Plaintiffs' injuries were caused by lead. (ECF No. 330-4, PageID.14312-14313.) This argument again ignores the fact that Dr. Graziano is only a general causation expert. Plaintiffs are required to provide expert testimony on general causation. *Powell-Murphy*, 333 Mich. App. at 249-251. The fact that Dr. Graziano does not also testify to specific causation clearly does not render his general causation testimony irrelevant.

Because Dr. Graziano's testimony goes to a central element of this case, it is also highly probative. The exclusion of evidence under Rule 403 is appropriate only when its "probative value is substantially outweighed by the danger of unfair prejudice." *United States v. Asher*, 910 F.3d 854, 860 (6th Cir. 2018) (citing *Huddleston v. United States*, 485 U.S. 681, 687 (1988)). Insofar as Dr. Graziano's opinions simply reflect the results of peer-reviewed scientific work, they do not present any danger of "unfair prejudice." *Id.* However, the Court understands VNA's concern that the scientific consensus that there is no evidence of a toxicity threshold is not equivalent to affirmative evidence that there is no such threshold. Where expert testimony is easily misunderstood, "a district court...could require

advocates to describe it in a way that will not generate unfair prejudice or mislead the jury.” *Gissantener*, 990 F.3d at 470 (citing Fed. R. Evid. 403) (cleaned up). When presenting his opinions, Dr. Graziano will be required to clarify that while studies show that very small amounts of lead cause neurocognitive harms, they have not yet proven that any specific amount of lead could do so.

### **B. Other Health Effects of Lead Poisoning**

According to VNA, all of Dr. Graziano’s other opinions are also both unreliable and irrelevant, because (1) Dr. Graziano concedes that science has not *proven* that lead exposure can cause any health effect other than intelligence decrements, and (2) Plaintiffs do not allege that they suffer from many of the injuries discussed by Dr. Graziano.

To begin with the second argument: it is undisputed that no bellwether Plaintiff suffers from hypertension, renal disease, schizophrenia, Parkinson’s disease, or essential tremors. At oral argument, Plaintiffs argued that testimony regarding these conditions is nevertheless relevant because Plaintiffs face an increased risk of suffering from them in the future. (ECF No. 424, PageID.31723.)

In Michigan, recovery for potential future illness is possible only if a plaintiff can establish “with ‘reasonable certainty’” that she will contract that illness. *Larson v. Johns-Manville Sales Corp.*, 427 Mich. 301, 317-18 (Mich. 1986) (quoting *Prince v. Lott*, 369 Mich. 606, 609 (1963)); accord *People v. Corbin*, 312 Mich. App. 352, 365n3 (2015). Plaintiffs do not claim that they can establish with a reasonable certainty that they will eventually suffer from any of these conditions. Instead, Plaintiffs seek to recast all of them as “symptoms” of their *present* condition: being “lead poisoned.” (ECF No. 424, PageID.31724 (“those ailments are symptomatic of lead poisoning.”)) But this recasting would eviscerate the rule of *Larson*: it would convert every possible harm resulting from any toxic exposure to a symptom of the condition of being exposed. Cancer is not a symptom of asbestos exposure, but an illness that can be caused by asbestos exposure. *Larson*, 427 Mich. at 317-18. Similarly, the health risks identified by Dr. Graziano are not symptoms of lead exposure but illnesses that may be caused by lead exposure. Accordingly, Plaintiffs could meet the *Larson* burden only if they established that they are “reasonably likely” to suffer from these

conditions in the future. Plaintiffs admit they cannot do so. (*See* ECF No. 424, PageID.31723-31725.)

Evidence is relevant for purposes of Rule 702 when there is a “factual issue in dispute that expert testimony can clarify.” *United States v. LaVictor*, 848 F.3d 428, 442 (6th Cir. 2017) (citing *Lee v. Smith & Wesson Corp.*, 760 F.3d 523, 527-28 (6th Cir. 2014)). Because Plaintiffs do not suffer from hypertension, renal disease, schizophrenia, essential tremors, or Parkinson’s disease, and because they cannot meet the *Larson* burden, the tendency of lead to cause those illnesses does not help the jury resolve a “factual issue in dispute.” *LaVictor*, 848 F.3d at 442. It is therefore not relevant for purposes of Rule 702. Moreover, because the evidence is not probative and presents a risk of significant unfair prejudice to the defendants, it is also inadmissible under Rule 403. *Asher*, 910 F.3d at 860.

In making this evidentiary ruling, the Court is limited to the current record. Should Plaintiffs obtain evidence that they are in fact likely to suffer from, or already suffer from, any of the conditions considered by Dr. Graziano, they may request reconsideration of this decision.

In addition, to the extent Plaintiffs planned to use Dr. Graziano's testimony to establish the public health importance of preventing lead from leaching into a water supply, they are permitted to elicit general testimony from Dr. Graziano to the effect that lead-poisoning can cause serious medical conditions beyond those suffered by Plaintiffs.

This leaves Dr. Graziano's opinion that lead can cause antisocial and aggressive behaviors. Defendants assert that no Plaintiff has displayed any such behaviors, but that is incorrect. Several Plaintiffs did exhibit some mildly aggressive and antisocial behaviors. (ECF No. 330-57, PageID.15734 (reporting some "behavioral disturbances" for R.V.); ECF No. 330-56, PageID.15719-20 (noting aggressive behaviors and volatile moods for A.T.), ECF No. 330-58, PageID.15747 (noting social behavioral problems for D.W.)). Therefore, this portion of Dr. Graziano's testimony is not irrelevant.

VNA also argues that Dr. Graziano's opinions regarding antisocial and aggressive behaviors are inadmissible because they are unreliable.<sup>8</sup>

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<sup>8</sup> As has been noted above, VNA argues the same as to all the other health conditions, but that issue is mooted by the exclusion of Dr. Graziano's testimony as to those health conditions on relevance and prejudice grounds.

According to VNA, Dr. Graziano's report and testimony suggest only an association between lead poisoning and these behaviors, not a causal link. (ECF No. 330-4, PageID.14319.) This is dispositive, VNA claims, because courts routinely exclude expert testimony that establishes only an association. VNA incorrectly characterizes both Dr. Graziano's testimony and the law.

First, Dr. Graziano indeed opines that, for behavioral symptoms, the science has not proven a causal link. (ECF No. 433, PageID.33381.) But he immediately clarifies that in his view the great weight of the evidence supports an inference that the behavioral symptoms are caused by lead exposure. (*See id.*, PageID.33382-33383) (discussing Bradford Hill criteria as to the five health outcomes other than intelligence decrements). Rule 702 permits such reasonable scientific inferences. *See, e.g., In re Heparin*, 803 F.Supp.2d at 742 (quoting *Jahn*, 233 F.3d at 388).

Second, the cases cited by VNA stand for the unremarkable proposition that evidence of *mere* association is not admissible as causation testimony. For instance, VNA selectively quotes *Nelson* as saying that "an association does not mean there is a cause-and-effect relationship." (ECF No. 330-8, PageID.14317.) But *Nelson* continues:

“before any inferences are drawn about causation, *the possibility of other reasons for the association must be examined, including chance, biases such as selection or informational bias, and confounding causes.*” *Nelson*, 243 F.3d at 253 (emphasis added.) Of course, the epidemiological studies cited by Dr. Graziano do conduct precisely the examination that was missing in *Nelson*.

VNA’s other cases are similarly inapplicable. *In re Aredia* concerns testimony that certain medications could cause osteomyelitis of the jaw by an expert who had never treated osteomyelitis, had no experience with either medication, and had no evidence that the two were causally related. *In re Aredia & Zomea Prods. Liab. Litig.*, 483 F.App’x 182, 187 (6th Cir. 2012). And in *Wells* and *Meister*, courts rejected testimony where the science did not establish even an association. *Wells v. Smithkline Beecham Corp.*, 601 F.3d 375, 379 (5th Cir. 2010) (expert’s evidence of association was based on a single paper, which was rejected for publication); *Meister v. Med. Eng.’g Corp.*, 267 F.3d 1123, 1129-30 (D.C. Cir. 2001) (causation testimony unreliable where evidence did not even show mere association).

Unlike the experts in any of these cases, Dr. Graziano cites to peer-reviewed, epidemiological studies which account for confounding variables. (See ECF No. 330-32, PageID.15427-15428) (reviewing the scientific literature). It is on the basis of those studies that Dr. Graziano concludes that “[t]he weight of evidence relating childhood lead exposure to antisocial behavior across these varied studies is therefore perceived to be strong.” (*Id.* at PageID.15428.) Opinions based on similar epidemiological studies are widely used to establish general causation at trial. *E.g.*, *In re Meridia Prods. Liab. Litig.*, 328 F.Supp.2d 791, 800 (N.D. Oh. 2004) (epidemiological studies are preferred mode of showing general causation, though they are not required) (citing *Conde v. Velsicol Chem. Corp.*, 804 F.Supp.972, 1025-26 (S.D. Oh. 1992)); *Henricksen*, 605 F.Supp.2d at 1161 (Ninth Circuit requires epidemiological study or differential diagnosis to show causation); *In re Viagra Prods. Liab. Litig.*, 572 F.Supp.2d 1071, 1078 (D. Minn. 2008) (“epidemiologic studies often are used to assess an association between a drug and disease and in turn general causation”) (citing *In re Rezulin Prods. Liab. Litig.*, 369 F.Supp.2d 398, 406 (S.D.N.Y. 2005)); *Reference Guide on Epidemiology, in Reference Manual on Scientific Evidence* 333, 338 (Fed. Jud. Ctr. 2d.

ed. 2000) (discussing use of epidemiological studies, warning against using “the mere possibility of uncontrolled confounding” to call studies into question).

“There are no certainties in science.” *Daubert*, 509 U.S. at 590. Dr. Graziano, having carefully reviewed the literature, concludes that the weight of the scientific evidence strongly suggests, but does not prove, that lead exposure can cause antisocial and aggressive behaviors. That is an accurate, indeed, cautious summary of the scientific consensus. It is therefore admissible evidence.

### **C. Background on Flint Water Crisis**

Finally, VNA objects to claims Dr. Graziano makes in his “brief description of the Flint lead poisoning episode.” (ECF No. 330-32, PageID.15421.) Dr. Graziano provided this background to explain the “purpose of [his] report,” *Id.*, and it seems unlikely he intends to testify to any of it. However, Dr. Graziano does opine that “a sequence of extremely poor engineering and policy decisions” led to the poisoning of Flint residents (*Id.* at PageID.15422.)—a claim with which VNA understandably takes issue. Because Dr. Graziano is not an expert on the subject of engineering and not qualified to offer expert opinions about the

causes of the Flint water crisis, his opinions about what may have caused the Flint water crisis are not admissible.

#### **IV. Conclusion**

For the reasons set forth above, VNA's motion to exclude Dr. Graziano's opinions and testimony is GRANTED IN PART and DENIED IN PART.

IT IS SO ORDERED.

Dated: December 1, 2021  
Ann Arbor, Michigan

s/Judith E. Levy  
JUDITH E. LEVY  
United States District Judge

#### **CERTIFICATE OF SERVICE**

The undersigned certifies that the foregoing document was served upon counsel of record and any unrepresented parties via the Court's ECF System to their respective email or First-Class U.S. mail addresses disclosed on the Notice of Electronic Filing on December 1, 2021.

s/William Barkholz  
WILLIAM BARKHOLZ  
Case Manager